Comparison of Nutritional Behaviors in Patients with Allergic Rhinitis and Healthy Controls

Maneli Karamzadeh [1], Maryam Javadi [2], Ameneh Barikani [3], Mohammad Ali Zohal [4,*]

Running Title: Nutritional Behaviors & Allergic Rhinitis

1. Children Growth Research Center, Qazvin University of Medical Sciences, Qazvin, Iran
2. Department of Nutrition, Children Growth Research Center, Qazvin University of Medical Sciences, Qazvin, Iran
3. Department of Community Medicine, Children Growth Research Center, Qazvin University of Medical Sciences, Qazvin, Iran
4. Department of Respiratory Diseases, Metabolic Diseases Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

***Corresponding Author: Mohammad Ali Zohal**
Address: Metabolic Diseases Research Center, Velayat Hospital, Minoodar Street, Qazvin, Iran
Tel: +98 28 33790620
Fax: +98 28 33326033
Email: zohal11@yahoo.com

Abstract

Background: Allergic rhinitis might be seasonal or permanent. In this regard, inappropriate nutrition can contribute to allergy**.**

Objectives: The aim of this study was to compare the nutritional behaviors in patients with allergic rhinitis and healthy controls in Qazvin, Iran.

Methods: This is an analytical, epidemiologic (Case-Control or Causal-Comparative) study. The study was initiated by selecting the patients diagnosed with the allergic rhinitis based on the clinical signs and the diagnosis of the lung super specialist. The group was compared with the patients' companions as control group (healthy individuals). The data were collected in both groups using the following questionnaires: 1- Demographic Questionnaire (Age, Gender, Education, and Occupation), 2- Checklist of Disease (Type, History, Duration, and Comorbidity), and 3- Nutritional Behavior Questionnaire. The checklist and questionnaire were completed at the clinic. The data were analyzed in SPSS 22.

Results: A total of 144 patients and 225 companions were selected. Urban life frequency was significantly higher in control than in patient group. Frequency of hereditary diseases was significantly higher in the patient group than the control. No significant difference was found in terms of nutritional behavior frequency (Good, Moderate, Bad) between the patient and control groups. The frequency of snack, saturated oil and vegetable consumption was significantly higher in the control group than in the case group. No significant difference was found between two groups in terms of the frequency of nutritional behaviors (Good, Moderate, Bad) based on gender, BMI, and age group.

Conclusions: According to the results, vegetable, saturated oil, and snack consumption was significantly higher in control group. However, no significant difference was found between two groups in terms of the prevalence of nutritional behaviors (Good, Moderate, Bad).

Key Words: Allergic Rhinitis, Nutritional Status, Behavior, Allergens, Asthma.

1. Background

Allergic disorders, especially asthma, have been on the rise worldwide. The prevalence of childhood asthma has increased over the past years. There is a lot of data on prevalence of childhood asthma, but there are limited data on prevalence of asthma in adults (1). Therefore, it is essential to consider the probability of an increase in its incidence. Some authors report the mean prevalence rates among schoolchildren and adolescents respectively 24.3 and 19.0% for active asthma; 12.6 and 14.6% for rhinoconjunctivitis; and 8.2 and 5.0% for atopic eczema (2). Asthma is a highly prevalent and chronic respiratory condition, characterized by reversible airflow obstruction, airway hyper-responsiveness, and airway inflammation. This produces symptoms of shortness of breath, cough, wheezing, and chest tightness. Some clinical trials usually define a severe exacerbation as the need for treatment with systemic corticosteroids, hospital admission or emergency treatment for worsening asthma, or a decrease in morning peak flow (3, 4).

Allergic diseases are extremely common and allergic rhinitis alone affects 10%–30% of the world's population and up to 40% of children in some countries. Allergic diseases affect the quality of life of patients and are financially costly to both patients and health systems. Therefore, it is important to identify the factors that cause their development. One potential risk factor for allergic diseases is active or passive exposure to tobacco smoking. In some countries up to 80% of children are exposed to second-hand smoking (5). Exposure to domestic fungi is also associated with the increased risk of rhinitis. Dust, food, flower pollen, tobacco are the main allergic rhinitis causes and stabilizers (6). Evidence has shown that food sensitization in early life may predispose individuals to later allergic conditions in childhood (7). In this regard, inappropriate nutrition, nutritional supplements, and early supplementary nutrition in children can contribute to allergy (8). There is a growing evidence of an association between obesity and asthma, both in children and adults. Adiposity indicators are associated with asthma, asthma severity/control, and atopy in Puerto Rican children. Atopy significantly mediates the effect of adiposity on asthma outcomes. (9).

Asarnoj et al. reported that children sensitized to peanut but not birch, more often reported symptoms to peanut ingestion. Furthermore, research has shown that sensitization to environmental allergens can be significant triggers for asthma. In a

study where 20% of children who reported food allergy also had asthma. Research shows that, generally, peanut, egg, milk, shrimp etc. have allergic reactions (10).
In addition, Garcia-Marcos et al. evaluated the relationship of the Mediterranean diet (vegetables, pulses, cereals, potatoes, pasta, and rice) with asthma and rhino-conjunctivitis in more than 20,000 children, adjusting for exercise and obesity, and found its protective effect against current severe asthma in girls. Seafood and fruit, also, were protective against having rhino-conjunctivitis. Take-away food consumption greater than once a week showed an increased (although not significant) bronchial hyper-responsiveness, but had no effect on atopy (11).
Besides, a recent meta-analysis of 51 studies demonstrated that the prevalence of self-reported food allergy to cow's milk, egg, peanut, fish, and shellfish varied between 3% and 35%. However, when the data were analyzed from six studies using oral food challenges (OFCs), the prevalence of food allergy was between 1% and 10.8% (12).
The study by Karimi et al. also showed that wheezing had a significant relationship with excessive consumption of foods such as chocolate, cheese puffs, chips and eggs (13).

2. Objectives

According to above mentioned issues, high prevalence of allergic rhinitis, and the relationship between various factors such as foods and the allergic rhinitis incidence, the aim of this study was to compare the nutritional behaviors in patients with allergic rhinitis and healthy controls in Qazvin, Iran.

3. Patients and Methods

This case-control study was carried out in 2015 among the patients diagnosed with allergic rhinitis and asthma visiting the Qazvin Lung Super Specialty Clinic, Iran. The study protocol was confirmed by the ethics committee of Qazvin University of Medical Sciences (IRQUMS.REC.1394.276). Informed consent was obtained from each participant. Convenience sampling was used based on the clinical symptoms and the diagnosis of lung super specialist. Two companions were selected as control per patient. The BMI and gender were almost similar between the case and control.

Inclusion Criteria

- No metabolic disease

Exclusion Criteria

- Pregnancy
- Breastfeeding

The data were collected by three questionnaires: 1- Demographic Questionnaire (Age, Gender, Education, and Occupation), 2- Checklist of Disease (Type, History, Duration, and Comorbidity, etc.), and 3- 22-item Nutritional Behavior Questionnaire. The checklist and questionnaire were completed at the clinic. The data were analyzed in SPSS 22.

4. Results

In this study, 52 (36.6%) patients and 94 (41.8%) healthy individuals were male. The mean BMI was reported 67.3±15.5 and 71.2±13.4 (kg/m^2) in the case and control groups, respectively ($P>0.05$). The frequency of the place of urban residence was significantly higher in control group than the case ($P=0.0001$). Frequency of hereditary diseases was significantly higher in the case group than the control ($P=0.0001$). However, no significant difference was found in terms of education, employment status, and history of addiction ($P>0.05$) (Table 1). No significant difference was found between the case and control groups in terms of time of meals (breakfast, lunch, dinner), first, second, and before-bedtime snacks, and nutritional behaviors (Good, Moderate, Bad) ($P>0.05$). However, the frequency of snacks ($P=0.027$) was significantly greater in the control group than the case group (Table 2).

Table 3 compares food consumption.

As Table 3 shows, a significant difference was found in terms of animal fat (animal oil) ($P =0.016$) and vegetable ($P =0.03$) consumption between two groups.

5. Discussion

Urban life frequency was significantly higher in control than in patient group. The frequency of snack, saturated oil and vegetable consumption was significantly higher in the control group than the case group. Allergic rhinitis is the most common form of

rhinitis (14). The disease has many health-related, social and economic effects. Therefore, like all kinds of inhalants and food allergens, identifying the causes of this type of allergy is of great importance in every region. The results showed that the frequency of saturated oil, vegetable, and snack consumption was higher in the control group. Garcia-Marcos et al. evaluated the relationship of vegetables, pulses, cereals, potatoes, pasta, and rice with asthma and rhino-conjunctivitis and found its protective effect against current severe asthma in girls. Seafood and fruit, also, were protective against having rhino-conjunctivitis (11).

Besides, a recent meta-analysis of 51 studies demonstrated that the prevalence of self-reported food allergy to cow's milk, egg, peanut, fish, and shellfish varied between 3% and 35%. However, when the data were analyzed from six studies using oral food challenges (OFCs), the prevalence of food allergy was between 1% and 10.8% (12).

Ellwood et al. studied the relationship of food consumption with the prevalence of wheezing, allergic rhino-conjunctivitis and eczema using the results of the ISAAC International Plan. They concluded that the signs of wheezing, allergic rhino-conjunctivitis and eczema declined as a result of increased calorie intake from cereals and rice, protein from cereals and nuts, starch and vegetables (15). The study by Tabak et al. on 598 8-13 year-old children showed that high consumption of whole grains had an inverse relationship with the prevalence of asthma and can have protective effects against asthma (16). The study by Heinrich et al. on the diets of 3827 individuals showed that increasing non-saturated acid consumption was responsible for increased prevalence of allergy (17, 18). Another study focused on the relationship between the consumption of all types of lipids and atopic diseases among 469 males and 333 females aged 20-64. The results showed that in men, the consumption of margarine and a higher proportion of omega-6 fatty acids to omega-3 are associated with an increased risk of alfalfa fever. In women, increased fat intake, unsaturated fatty acids and oleic acid were associated with an increase in alfalfa (14). The study on 5257 6-7 year-old children showed that the consumption of cooked vegetables, potatoes and fruits has a protective effect against asthma (19). The study by Karimi et al. showed that the excessive consumption of foods such as chocolate, cheese puffs, chips and eggs among children and adolescents was associated with the increased symptoms of asthma, allergic rhinitis

and eczema (13); however, the results of our study showed that no significant difference was found in terms of cereal consumption, especially rice.

In the present study, no significant difference was found between the frequency of nutritional behaviors (Good, Moderate, Bad) and fast-food and sausage consumption. However, a study in Saudi Arabia showed that higher fast-food consumption as a result of change in lifestyle in the past decade and consequently, the change in dietary habits has contributed to the increase in allergic symptoms and reactions (20). The study by Leduc et al. showed that pizza consumption caused allergic reactions to spices (21). In another similar study, hamburger consumption has intensified the sensitivity symptoms. Such symptoms depend on the amount of consumption so that greater hamburger consumption increased and intensified the symptoms (22).

No significant difference was found in terms of nutritional behaviors (Good, Moderate, Bad) between two groups based on gender, BMI, and age groups. Fouladseresht et al. investigated the prevalence of food and inhalation allergens of allergic patients in Kerman, Iran. This cross-sectional study was carried out on 54 atopic dermatitis patients, 64 allergic rhinitis patients, and 39 chronic urticaria patients. They concluded that sensitivity to beetles, egg whites, egg yolks and tomatoes is significantly different between males and females so that the sensitivity to these four allergens is more common in men than in women. According to the results, the prevalence of sensitivity to food and inhalation allergens appears to differ depending on nutritional habits and living conditions (23).

Racial and ethnic differences are other important and effective factors so that there is a vast difference in allergic pattern of various countries. Such difference is greater in food allergens than in inhaler allergens (24). Although changes in the eating habits in recent years and higher consumption of fast foods, chocolate, chips, cheese puffs, and sausage are like to be effective in increasing prevalence of atopic diseases such as asthma, allergic rhinitis and eczema, further studies are required to examine the effect of compounds on the number and function of T cells and the level of interleukins. Until then, training proper food consumption and avoiding environmental allergens can help reduce the symptoms of allergic diseases. Due to lack of studies on the effect of allergens and nutritional behaviors on the incidence of allergic diseases, including rhinitis and asthma, further studies with more participants are required in this regard in

order to accurately examine the topic. Intervening factors are recommended including age and living-condition standardization.

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Conflicts of interest

Nothing to declare.

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Table 1: Comparison of Qualitative Variables in Two Groups

Variable	Classification	Case	Control	P-Value
		Frequency (%)	Frequency (%)	
Place of Residence	-	104 (74.3%)	200 (89.7%)	0.0001
Education	Illiterate and Low Literacy	45 (31.9%)	75 (34.6%)	0.148
	Incomplete Secondary Education	39 (27.7%)	43 (19.8%)	
	Secondary Education and Associate Degree	35 (24.8%)	56 (25.8%)	
	Bachelor and Higher	22 (15.6%)	43 (19.8%)	
Employment Status	Unemployed/House Keeper	93 (65.5%)	113 (51.6%)	0.197
	Retired	9 (6.3%)	28 (12.8%)	
	Employee	16 (11.3%)	32 (14.7%)	
	Self-Employed	16 (11.3%)	31 (14.2%)	
	Worker/Farmer	8 (5.6%)	14 (6.4%)	
History of Addiction	-	9 (6.3%)	20 (8.9%)	0.358
Hereditary Diseases	-	58 (40.6%)	7 (3.1%)	0.0001

Table 2: Comparing Nutritional Behaviors based on BMI in Two Groups

Nutritional Behaviors	Response	Case	Control	P-Value	Odds Ratio
		Frequency (%)	Frequency (%)		
Snack Consumption	No	99 (69.2%)	130 (57.8%)	0.027	1.644
	Yes	44 (30.8%)	95 (42.2%)		
Type of Food	Modern	3 (2.2%)	3 (1.4%)	0.560	1.609
	Traditional	133 (97.8%)	214 (98.6%)		
Use of Media along with Food	No	121 (84.6%)	173 (76.9%)	0.071	1.653
	Yes	22 (15.4%)	52 (23.1%)		

Table 3: Comparing Food Consumption based on BMI in Two Groups

Nutritional Behaviors	Response	Case	Control	P-Value	Odds Ratio
		Frequency (%)	Frequency (%)		
Sausage Consumption	No	58 (40.6%)	109 (48.7%)	0.129	0.720
	Yes	85 (59.4%)	115 (51.3%)		
Animal Fat Consumption	No	19 (13.3%)	53 (23.6%)	0.016	0.479
	Yes	124 (86.7%)	172 (76.4%)		
Rice Consumption	No	28 (19.7%)	42 (18.9%)	0.850	1.053
	Yes	114 (81.3)	180 (81.1%)		
Fish Consumption	No	79 (52.2%)	135 (60.3%)	0.341	0.814
	Yes	64 (44.8%)	89 (39.7%)		
Dairy Consumption	No	2 (1.4%)	2 (0.9%)	0.646	1.582
	Yes	141 (98.6%)	223 (99.1%)		
Type of Dairy	Local	45 (32.1%)	83 (37.2%)	0.324	0.799
	Pasteurized	95 (67.9%)	140 (62.8%)		
Fruit Consumption	No	14 (9.8%)	15 (6.7%)	0.278	1.519
	Yes	129 (90.2%)	210 (93.3%)		
Vegetable Consumption	No	52 (36.4%)	50 (22.2%)	0.003	2.000
	Yes	91 (63.6%)	175 (77.8%)		